

BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 06B

2006 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division

Environmental Quality Control - Bureau of Water

2600 Bull Street

Columbia, South Carolina 29201

July 2006



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2006 ANNUAL UPDATE

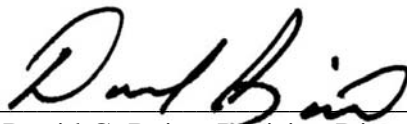
[Data Thru December 2005]

Shellfish Management Area 06B Shellfish Sanitation Program



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ANNUAL UPDATE
Shellfish Management Area 06B
SCDHEC EQC Bureau of Water

Data Inclusive Dates:

01 / 01 / 03 thru 12 / 31 / 05

Classification Change:

 X Yes No

Shoreline Survey Completed: No

(I)ncreased/(D)ecreased/(N)one:

 D Approved

 N Conditionally Approved

 I Restricted

 N Prohibited

Prior Report & Date: Annual -2005

SUMMARY

There is virtually no upland development within Area 06B. The majority of Area 06B is located within the confines of the Cape Romain National Wildlife Refuge. Extensive wildlife and waterfowl populations within the management area likely contribute significantly to shellfish growing waters fecal coliform concentrations.

An additional contributor to adverse water quality within Area 06B appears to be related to the Santee Rediversion Project. The project resulted in the routine rediversion of substantial amounts of fresh water to the South Santee River. The South Santee River partially defines the management area's northern boundary. There appears to be a strong positive correlation between river flow and fecal coliform concentration in the upper areas of Area 6B. The daily flow rates from the Santee River Station - 02171700 are included to monitor trends of increased or decreased flows as they relate to changes in the area.

Data collected during this three-year review period indicate Approved/Restricted classification boundary modifications are necessary. These changes will reclassify currently Approved portions of Area 06B north and west of a line extending from the north bank of Casino Creek near Station 06B-24, through Station 06B-27, and then continuing to the Area 07 boundary near Station 07-08A. These reclassifications will also include the currently Approved southern portions of Alligator Creek and adjacent marshlands from Station 06B-21 to those waters of Cape Romain Harbor within approximately 1000 feet of Station 06B-06.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically

addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The United States Food and Drug Administration (USFDA) uses The National Shellfish Sanitation Program's (NSSP) *Guide for the Control of Molluscan Shellfish* to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey, which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision.

For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters designated as Shellfish Management Area 06B (Area 06B). Area 06B consists of approximately 15,223 acres of shellfish growing area habitat located in Charleston County, South Carolina. Area 06B consists of the waters of Cape Romain Harbor, the Atlantic Intracoastal Waterway (AIWW), portions of Muddy Bay, and Alligator, Casino, Clubhouse, Congaree Boat, DuPree, Horsehead, Mill, Ramhorn and Skrine Creeks. The northern boundary of the area is the South Santee River, while US Highway 17 defines the western border. The area is bounded to the south by an imaginary line extending from AIWW Marker #32 southeastward to Cape Island and the southern portion of Cape Romain Harbor. The eastern boundary is the Atlantic Ocean.

The harvesting classification of Area 06B prior to this sanitary survey was as follows:

Prohibited: None

Restricted:

1. The Atlantic Intracoastal Waterway, including adjacent marshlands, from its confluence with the South Santee River to the Area 07 boundary;
2. All portions of Area 06B northwest of a line extending to the south/southwest from Station 06B-21 to the north bank of Casino Creek at Station 06B-15, continuing along the north bank of Casino Creek to Station 06B-16, then northwest through Station 06B-23 to Station 06B-20, then continuing south to 06B-26, then southwestward to the Area 07 boundary.

Approved: All other waters in Area 06B.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State Shellfish Grounds, Culture permits, and Kings Grant areas. The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina. It is primarily gathered on a small scale by the general public for recreational harvest. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 06B, for direct marketing purposes, from the restricted waters listed below in the Recommendations.

There are two State Shellfish Grounds (S), S-336 and S-328, within Area 06B. Multiple Culture permit (C), and Mariculture permit (M) areas are located in Area 06B, as well as a single King's Grant (G). The Kings Grant lease, G-318, is located along Jeremy Island and includes portions of DuPree Creek.

The shellfish-harvesting season in South Carolina normally extends from mid-September through mid-May. The SCDNR has the authority to alter the shellfish-harvesting season for resource management purposes and grant permits for year-round mariculture operations.

Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

One Area 06B pollution source continues to fluctuate. Freshwater inflow from the Santee River system is highly variable.

SURVEY PROCEDURES

Shoreline surveys of Area 06B were not conducted during this reporting year. A shoreline survey will be conducted by the Trident District Shellfish Sanitation staff, by watercraft, vehicle and on foot, during the next survey period.

POINT SOURCE POLLUTION

- A. Municipal and Community Waste Treatment Facilities** - The sole domestic wastewater treatment facility within close proximity to Area 06B shellfish waters is the Lincoln High School facility in McClellanville, South Carolina. Lincoln High School no longer discharges its treated effluent into Shingle Canal which ultimately drains to the administratively Prohibited waters of Jeremy Creek (Area 07). This National Pollutant Discharge Elimination System (NPDES) site is currently inactive under permit number SC0033618. In 2003, Lincoln High School used a pump and haul disposal method for wastewater disposal. In January of 2004, a permit was issued to Lincoln High School allowing land disposal of the treated wastewater on a parcel of land a few miles from the actual school. The new land application permit number for Lincoln High School, Charleston County School District, is ND0073016.
- B. Industrial Waste (Discharges)** - There are no industrial wastewater discharges located within the boundaries of Area 06B. However, Santee Cooper's Spillway Hydro at Wilson's Landing and the St. Stephens Hydro near St. Stephens, produce power and regulate freshwater flow into the Santee River system. In order to prevent flooding during periods of high flow into Lake Marion, freshwater is discharged from the Lake Marion Spillway to the Santee River. The vast amount of fresh water released into the Santee River during high flow periods likely impacts water quality within Area 06B.
- C. Marinas** - S.C. Regulation 61-47, Shellfish defines *Marina* as "any water area with a structure (docks, basin, floating docks, etc.), which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space." There are no marinas or commercial boat docking facilities located within Area 06B. Multiple commercial boat docking facilities are located in Jeremy Creek in adjacent Area 07. Sample data suggests that this creek poses minimal impact to additional portions of Area

06B.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 06B, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** - Nonpoint source pollution is the likely major contributing factor to lower water quality in Area 06B. There is little urban development within Area 06B. There have been minimal stormwater permits issued within this area. The Army Corps of Engineers did not conduct any dredging projects during 2005 in Area 06B. Stormwater runoff impacts water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

The uplands surrounding the shellfish growing waters of Area 6B consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within Area 06B consist of numerous soil types, the area is generally comprised of Seewee-Rutlege soils, nearly level and gently sloping woodland and cropland loamy fine sand. The USDA (1971) further describes these soils as "somewhat poorly drained to moderately well drained, nearly level, sandy soils on ridges and poorly drained to very poorly drained, sandy soils in depressions."

- B. Agricultural Runoff** - There are no permitted agricultural facilities located in Area 06B. The lack of concentrated agricultural activity near the shoreline of the growing waters precludes contamination of shellfish waters from agricultural runoff.
- C. Individual Sewage Treatment and Disposal Systems** - There has been no documentation of new residential construction adjacent to shellfish growing waters in this area. Existing homes utilize individual sewage treatment disposal (ISTD) systems. Each new system requires inspection and approval by the Division of Environmental Health, Trident Health District.
- D. Wildlife and Domestic Animals** - Area 06B supports substantial populations of both wildlife and domestic animals. The lands throughout the area help comprise the Cape Romain National Wildlife Refuge. The refuge contains such wildlife as beaver, rabbit, white-tailed deer, raccoon, opossum, alligators, various rodents and a substantial bird population typical of the coastal Carolinas. The tidal uplands in the refuge have small creeks and drainage ditches throughout the area. This creek system becomes a conduit for animal fecal coliform bacteria to be transported to the adjacent shellfish growing waters.

The Santee Coastal Reserve Management Area operates multiple impoundments that are used by migratory waterfowl. The impoundments have set spillways that overflow at times of heavy rains to maintain a consistent level in the impoundment. The impoundments are located primarily between the South Santee River and south Alligator Creek, draining into the AIWW.

- E. Boat Traffic** - Recreational boat traffic is moderate throughout the area except during the winter months. Commercial traffic in the AIWW consists primarily of tugs and barges. Commercial fisheries boats, ranging in size from 16 to 50 feet, will operate in the area as long as product demand exists.
- F. Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require periodic maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites.
- G. Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 06B. The Shellfish Sanitation Section has developed a Biotoxin Contingency Plan. The Department also participates in an interagency Toxic Algae Workgroup and directs a Toxic Algae Emergency Response Team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 06B is comprised of salt and brackish marsh and includes shallow bays and meandering creeks protected by a series of offshore barrier islands. The creeks within the area range from 50 to 600 feet in width and average 3 to 9 feet in depth. Additionally, the AIWW traverses the area's entire length in a northeast-southwest direction. The AIWW is maintained at a mean low water depth of 12 feet by the US Army Corps of Engineers and is the major conduit of low salinity water into Area 06B from the South Santee River. Cape Romain Harbor, a shallow water bay, is the major conduit of high salinity ocean water into the area. The entire system is approximately eight miles wide (northwest to southeast) and eight miles long (southwest to northeast).

Tides - Tides in Area 06B are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Casino Creek are 4.6 feet during normal tides; 5.3 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Rainfall - Precipitation in Area 06B is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low-pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

The mean total annual rainfall for the thirty-year period 1971-2000, recorded at the Charleston International Airport, is 51.53 inches. The 2005 total precipitation recorded at the Wambaw Ranger District in Francis Marion National Forest at McClellanville, South Carolina

(approximately 35 miles northeast of Charleston) was 77.81 inches.

Winds - Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

River Discharges - The South Santee River is the major source of freshwater inflow into Area 06B. Flow from the Lake Marion spillway, St. Stephens hydroelectric generating station, and Lake Marion hydroelectric generating station, which discharge into the Santee River, reaches the lower Santee Rivers and surrounding waters of Area 06B approximately 48 hours from the time of release. In 2003, the average daily flow rate from Jamestown spillway was 14,806 cfs. In 2004, the daily average flow rate dropped to 7,438 cfs. This represents a 50% reduction in flow. In 2005, the water flow increased to 10,660 cfs.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 06B in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample 'cushion' (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report's water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

Seven hundred fifty-six routine surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from 21 active water quality sampling stations in Area 06B during the period 01/01/03 through 12/31/05. An additional fifty-four special samples were collected for reopening purposes following precautionary closures. Samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control's Region 7 Environmental Quality Control laboratory at North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees Celsius were discarded (APHA, 1970).

Surface water temperatures are measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages are determined by using Nautical Software's *Tides & Currents*, Version 2 (1996).

MONITORING RESULTS

Stations exceeding a fecal coliform geometric mean MPN value of 14 are 07, 08, 09, 10, 12, 13 and 19. No station exceeds a fecal coliform geometric mean MPN value of 88. Stations exceeding a fecal coliform MPN estimated ninetieth percentile value of 43 are 06, 07, 08, 09, 10, 12, 13, 16, 18, 19, 21, 22, 23 and 26. Station 13 exceeds an estimated ninetieth percentile fecal coliform MPN value of 260.

CONCLUSIONS

Based on the review of fecal coliform bacteriological data and the pollution source survey, Area 06B is impacted by two sources of actual or potential pollution.

NONPOINT SOURCE RUNOFF

Stormwater runoff continues to be a major source of fecal coliform bacteria contamination in the area. Area 06B lies within the boundaries of the Cape Romain Wildlife Refuge. The refuge provides suitable habitat for abundant wildlife populations. Dredge spoil areas used by the Army Corps of Engineers, surface water impoundments utilized by the Santee Coastal Reserve, and the numerous small tidal islands vast network of meandering creeks provide prime habitat for regional wildlife and migratory waterfowl.

FRESHWATER INFLOW

Area 06B receives substantial freshwater inflow via the South Santee River. This is primarily due to the added water released by Santee-Cooper as part of the diversion project. Analytical results suggest a direct relationship between lower salinity and elevated fecal coliform bacteria concentrations. Past annual updates (2004 and prior) have included a Table listing average daily flow rates released by Santee Cooper. While this data could be indispensable to manage Area 6B as a Conditionally Approved area, sparse regional manpower resources limit its usefulness. Yearly average daily flow rates from Santee River Station 02171700 near Jamestown, S.C. will continue to be included to monitor trends of increased or decreased flows as they relate to changes in the area.

RECOMMENDATIONS

The shoreline survey and the bacteriological data review of shellfish growing Area 06B indicate that the modification of current classification boundaries is appropriate. These

modifications are recommended to include portions of Area 06B north and west of a line extending from the north bank of Casino Creek near Station 06B-24, through Station 06B-27, and then continuing to the Area 07 boundary near Station 07-08A. These modifications are also recommended to include southern portions of Alligator Creek and adjacent marshlands from Station 06B-21 to those waters of Cape Romain Harbor within approximately 1000 feet of Station 06B-06.

The following harvesting classification for Area 06B is recommended:

Prohibited (Administrative Closure): None

Restricted:

1. The Atlantic Intracoastal Waterway, including adjacent marshlands, from its confluence with the South Santee River to the Area 07 boundary;
2. All portions of Area 06B northwest of a line extending from Station 06B-21 southwest to the confluence of Mill Creek and Casino Creek, continuing along the north bank of Casino Creek to Station 06B-24, then northwest through Station 06B-27, then continuing southwestward to the Area 07 boundary near Station 07-08A;
3. All adjacent marshland on the eastward side of Alligator Creek between stations 06B-21 and 06B-06;
4. The area within a 1,000 feet radius of Station 06B-06.

Approved: All other waters in Area 06B.

Station Additions/Deactivations/Modifications:

Deactivation: Station 06B-13. Due to the consistently elevated fecal coliform levels associated with freshwater influence from the South Santee River, combined with the lack of criticality in determining classification boundaries, it is recommended that Station 06B-13 be deactivated effective January 1, 2007.

Analysis of sampling data for Area 06B demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 06B will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured at the Wambaw Ranger District, Francis Marion National Forest, McClellanville, South Carolina. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). The National Weather Service publishes PMP estimates for the coastal United States in a series of hydro-meteorological reports (HMRs) (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*). In the event that the Wambaw Ranger District rain gauge is unavailable, rainfall may be monitored at the Town of McClellanville or the South Carolina Department of Natural Resources' Santee Coastal Reserve rain gauges.

REFERENCES

- American Public Health Association, Inc. *Procedures for the bacteriologic examination of sea water and shellfish*, 1970. p. 28-47. In *Recommended procedures for the examination of sea water and shellfish*, 4th ed. Library of Congress, Washington, D.C.
- National Research Council, 1985, '*Safety of Dams - Flood and Earthquake Criteria*' National Academy Press, Washington DC.
- National Shellfish Sanitation Program (NSSP)-- *Guide for the Control of Molluscan Shellfish*, 1997 Rev. U.S. Department of Health and Human Services, Washington, D.C.
- National Weather Service. The National Oceanic and Atmospheric Administration. *Precipitation Frequency Atlas of the Western US: NOAA Atlas II*. Superintendent of Documents, US Government Printing Office Washington DC.
- United States Department of Agriculture, Soil Conservation Service, 1971. *Soil survey of Charleston County, South Carolina*. In cooperation with South Carolina Agricultural Experiment Station and South Carolina Land Resources Conservation Commission, National Cooperative Soil Survey, Washington, D.C. p. 78.

TABLE #1

**Shellfish Management Area 06B
Water Quality Sampling Stations Description**

<u>Station</u>	<u>Description</u>
06	Alligator Creek and Ocean Inlet
07	Alligator Creek at Marker #26
08	Casino Creek at Marker #29
09	DuPre Creek - 500 feet north of new dock (south of Marker #30)
10	AIWW at Marker #32
12	Alligator Creek State Shellfish Ground
13	Alligator Creek nearest South Santee River between Markers 24 & 25(Deactivate 1/1/07)
14	Horsehead Creek at confluence with Cape Romain Harbor
15	Casino Creek at Cape Romain Harbor
16	Casino Creek midway between Stations 19 and 24 (at small unnamed creek on right, southbound)
17	Congaree Creek at Tower Creek
18	Confluence of DuPre Creek and Clubhouse Creek
19	Confluence of Casino Creek and Skrine Creek
20	1,000 yards up DuPre Creek from Clubhouse Creek
21	Confluence of Alligator Creek and Ramhorn Creek
22	Confluence of Ramhorn Creek and Mill Creek
23	Confluence of Skrine Creek and Congaree Boat Creek
24	Confluence of Casino Creek and Congaree Boat Creek
25	Confluence of Horsehead Creek and Unnamed Creek at lower end of Horsehead Island
26	Confluence of Skrine Creek and unnamed creek north of Muddy Bay
27	The confluence of the first large creek on the left, with Congaree Boat Creek, traveling southeast of Station 23

(Total 20 Active)

Figure 1.

Shellfish Management Area 06B Prior Classification

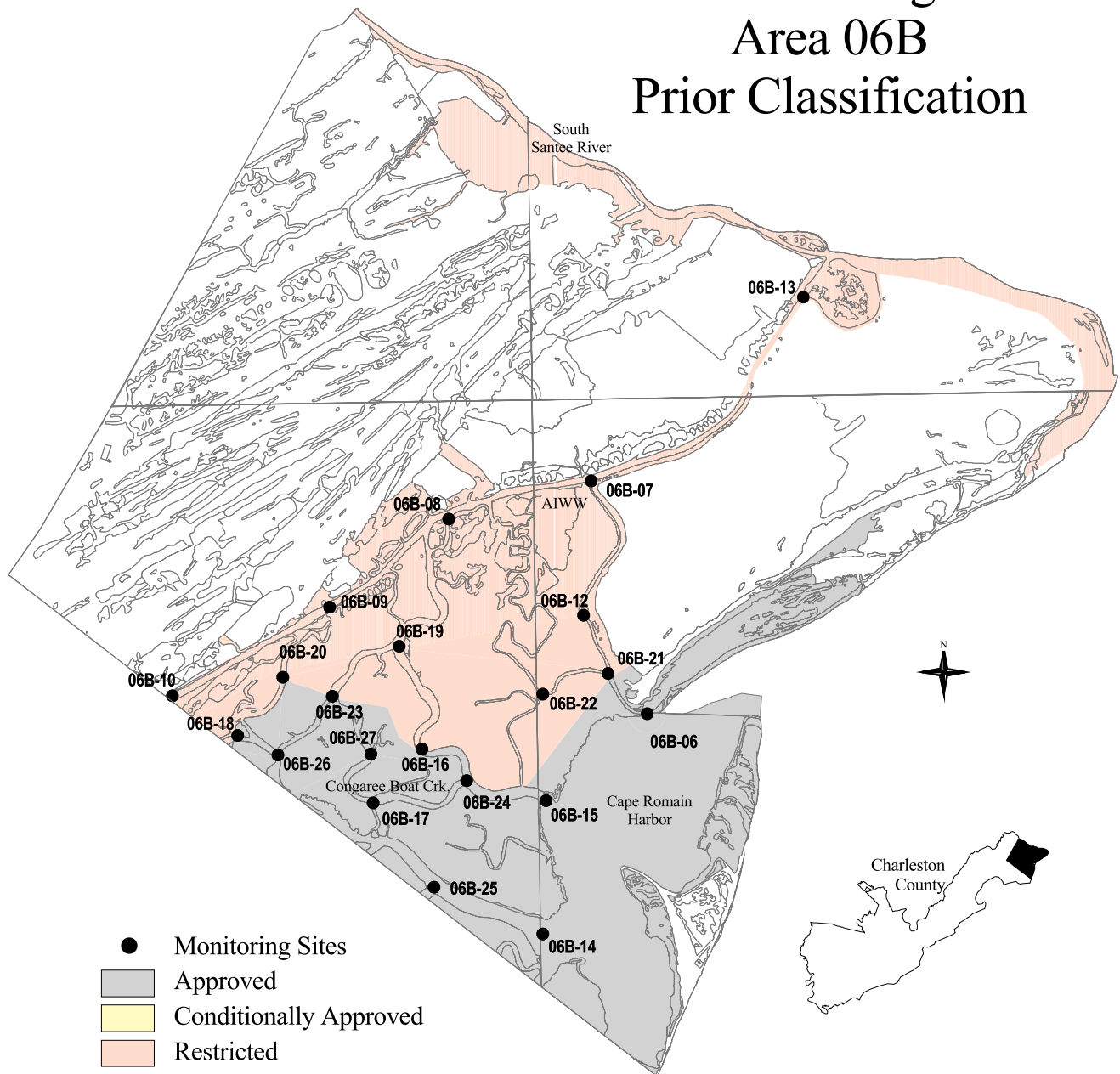


Figure 2.

Shellfish Management Area 06B Current Classification

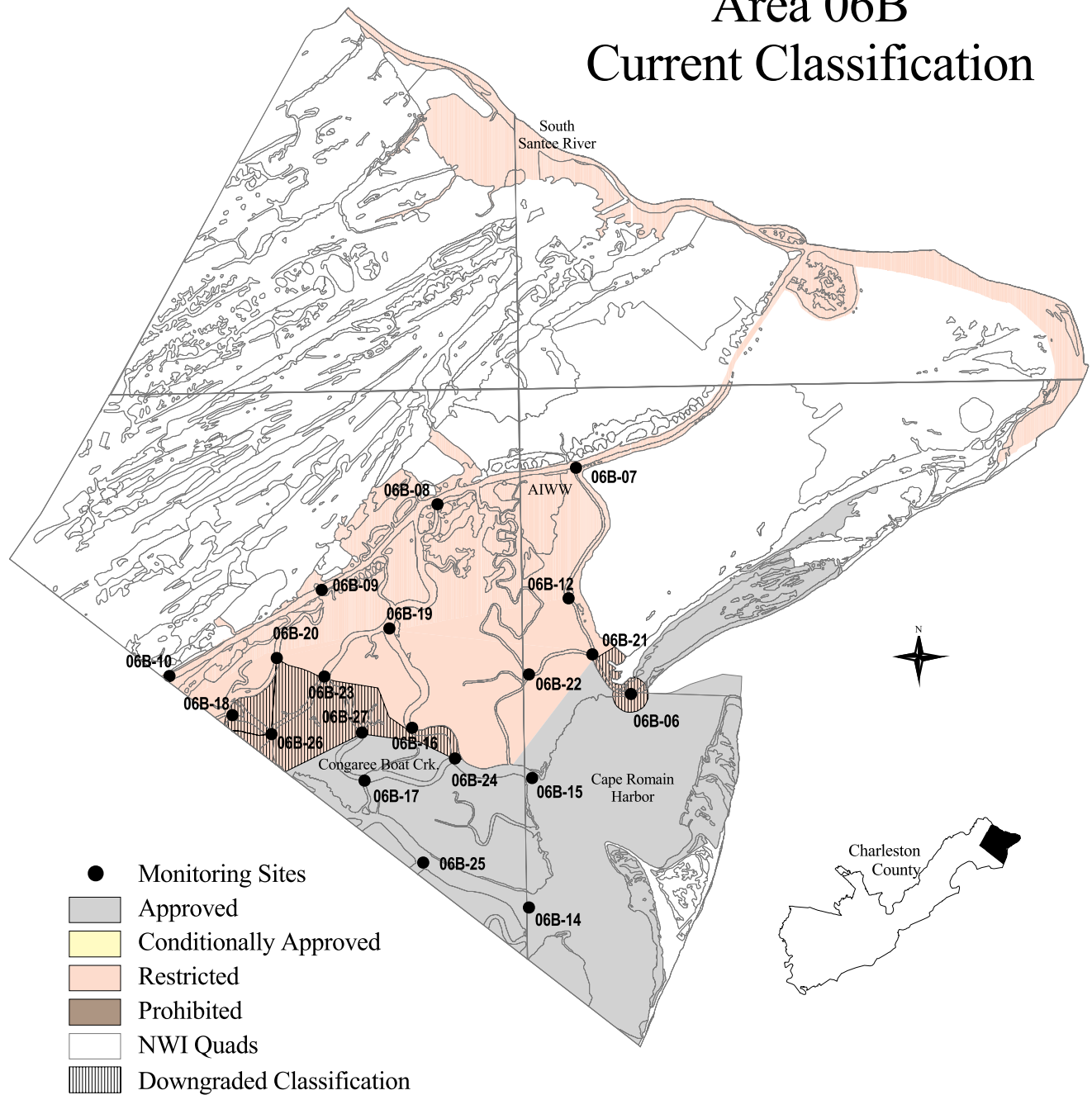


Figure 3.
Shellfish Management
Area 06B
Potential Pollution Sources

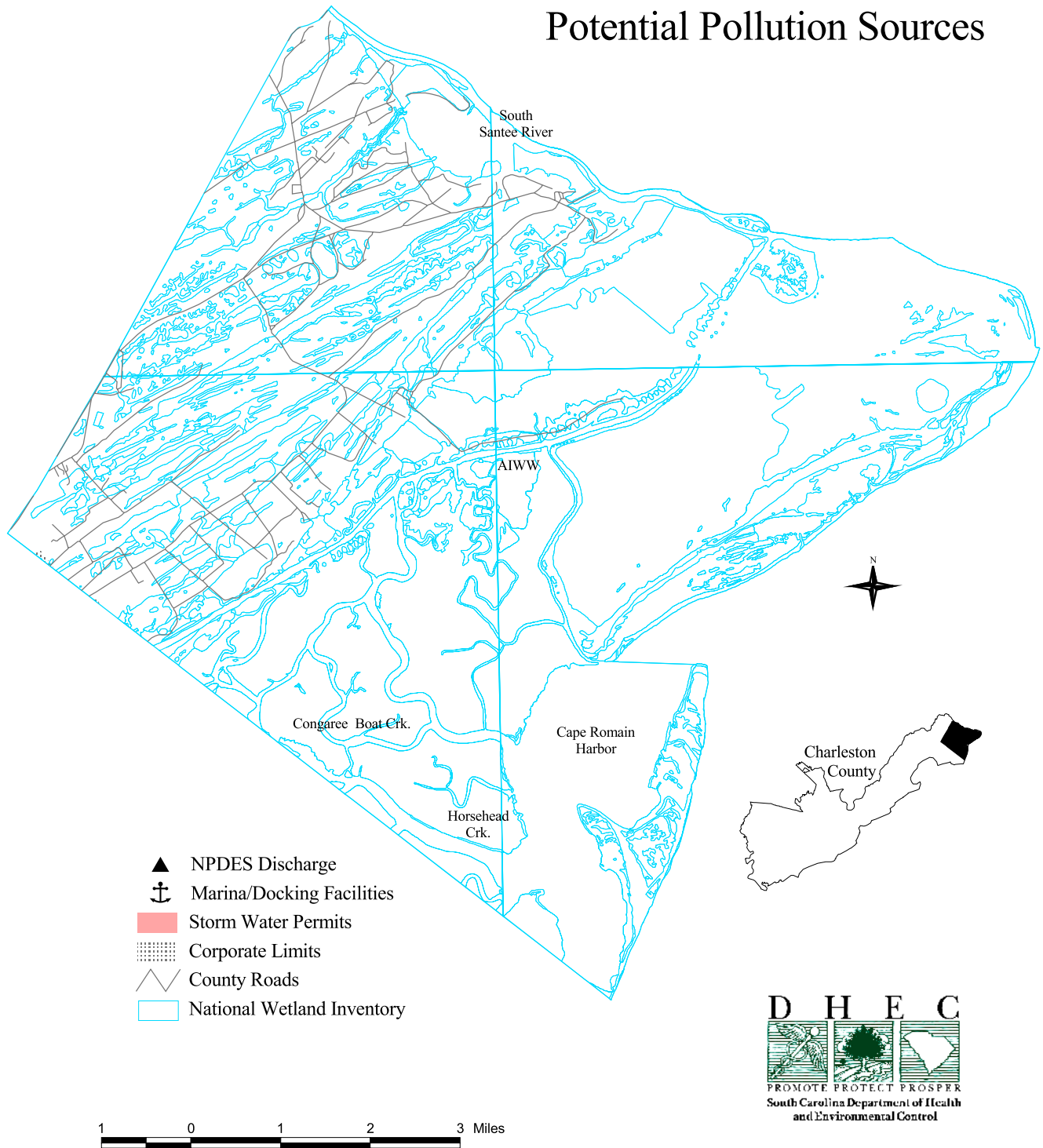


TABLE #2

Shellfish Management Area 06B
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations between

January 1, 2003 thru December 31, 2005

Station #	6	7	8	9	10	12	13	14	15	16
Samples	36	36	35	36	36	36	36	36	36	36
GeoMean	9.1	31.7	24.4	27.9	17.2	17.7	55.9	2.4	4.8	9.5
90th %ile	53	135	115	158	109	108	367	4	19	50
Water Qlty	R	R	R	R	R	R	RND	A	A	R
Classification	R	R	R	R	R	R	R	A	A	R

Station #	17	18	19	20	21	22	23	24	25	26
Samples	36	36	36	36	36	36	36	36	36	36
GeoMean	4.2	7.8	14.4	8.2	13.0	13.7	10.4	6.8	2.5	7.9
90th %ile	15	46	110	32	104	83	73	35	5	48
Water Qlty	A	R	R	A	R	R	R	A	A	R
Classification	A	R	R	R	R	R	R	R	A	R

Station #	27									
Samples	36									
GeoMean	6.3									
90th %ile	30									
Water Qlty	A									
Classification	R									

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #3

Shellfish Management Area 06B

**WATER QUALITY
SAMPLING STATIONS DATA**

Detailed data for each shellfish monitoring station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained by writing South Carolina's Department of Health and Environmental Control – Freedom of Information office at the address below.

Freedom of Information
SC Dept. of Health & Envir. Control
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #4

RAINFALL DATA

Shellfish Management Area 6B

SOURCE:

Rainfall information provided by Wambaw Ranger District
Francis Marion National Forest, McClellanville, SC

AREA 06B ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: Wambaw Ranger District

Francis Marion National Forrest, McClellanville, SC

2003	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.88	0.00	0.17	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00
2nd	0.00	0.00	1.35	0.00	0.00	0.00	0.48	0.00	0.01	0.00	0.00	0.00
3rd	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
4th	0.00	0.04	0.02	0.00	0.00	1.06	0.02	0.00	0.12	0.00	0.05	0.39
5th	0.00	0.00	0.04	0.00	0.00	0.05	0.07	0.00	1.19	0.00	0.01	1.14
6th	0.00	0.03	0.27	0.00	0.00	0.00	0.00	0.05	3.57	0.02	0.00	0.01
7th	0.00	0.46	0.00	0.07	1.18	0.36	0.00	0.07	0.07	0.00	0.00	0.00
8th	0.00	0.00	0.01	1.40	0.00	1.16	0.07	0.00	1.96	0.00	0.00	0.00
9th	0.00	0.00	0.01	2.33	0.00	0.90	0.00	0.05	0.00	0.81	0.00	0.00
10th	0.00	0.28	0.00	0.43	0.00	0.00	0.02	0.18	0.03	0.00	0.00	0.36
11th	0.00	0.00	0.00	0.04	0.00	0.00	0.22	0.00	0.04	0.07	0.00	0.99
12th	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
13th	0.00	0.00	0.07	0.00	0.00	0.00	1.75	1.07	0.00	0.00	0.00	0.00
14th	0.00	0.00	0.18	0.00	0.00	0.05	0.44	0.05	0.01	0.19	0.00	0.80
15th	0.00	0.00	0.41	0.00	0.51	0.26	0.00	0.00	0.00	0.11	0.00	0.08
16th	0.00	0.00	0.00	0.00	0.13	0.02	0.00	0.00	0.00	0.00	0.00	0.00
17th	0.04	0.37	0.00	0.00	0.18	0.88	0.00	0.00	0.00	0.00	0.00	0.07
18th	0.00	0.00	0.82	0.54	0.02	0.28	0.02	0.00	0.00	0.18	0.03	0.00
19th	0.00	0.00	0.00	0.03	0.49	0.37	2.97	1.47	0.00	0.00	0.06	0.00
20th	0.00	0.00	4.90	0.00	0.00	0.41	0.58	0.05	0.00	0.00	0.11	0.00
21st	0.00	0.00	0.26	0.00	0.00	1.09	0.00	0.24	0.00	0.00	0.00	0.00
22nd	0.20	0.33	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
23rd	0.01	0.91	0.00	0.00	3.48	0.00	1.20	0.00	0.16	0.00	0.00	0.00
24th	0.01	0.00	0.00	0.00	0.00	0.00	1.44	0.00	0.00	0.00	0.00	0.12
25th	0.00	0.00	0.00	1.71	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00
26th	0.00	0.00	0.00	0.30	0.00	0.00	2.26	0.00	0.00	0.03	0.00	0.00
27th	0.00	0.62	0.00	0.00	0.02	0.00	0.00	0.00	0.38	0.15	0.00	0.00
28th	0.00	0.04	0.01	0.00	0.64	0.00	0.23	0.00	0.00	0.90	0.00	0.00
29th	0.00	0.00	0.10	0.00	0.00	0.31	0.00	0.00	0.00	1.46	0.21	0.00
30th	0.00		0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.01		0.05		0.00		0.00	0.00		0.00		0.00

(Monthly Figures)

Year's Rainfall Total:

65.51

TOTAL	1.16	3.08	8.98	6.86	6.65	7.20	12.30	3.32	7.54	3.99	0.47	3.96
MAX	0.88	0.91	4.90	2.33	3.48	1.16	2.97	1.47	3.57	1.46	0.21	1.14
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.04	0.11	0.29	0.23	0.21	0.24	0.40	0.11	0.25	0.13	0.02	0.13

AREA 06B ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: Wambaw Ranger District

Francis Marion National Forrest, McClellanville, SC

2004	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	1.87	0.00	2.32	0.00	0.58	0.34	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.33	0.04	0.00	0.00	0.00
3rd	0.00	0.50	0.00	0.03	1.00	0.00	1.67	0.00	0.00	0.01	0.00	0.00
4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.16	0.00	0.00	0.00	0.00
5th	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	1.24	0.00	0.00	0.00
7th	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
8th	0.00	0.00	0.00	0.01	0.00	0.12	0.00	0.00	0.05	0.00	0.00	0.00
9th	0.27	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.32	0.00	0.00	0.08
10th	0.22	0.01	0.31	0.00	0.00	0.00	0.38	0.00	0.00	0.01	0.00	0.44
11th	0.00	0.00	0.00	0.00	0.00	0.00	1.69	0.00	0.21	0.00	0.00	0.00
12th	0.00	1.15	0.00	0.63	0.00	0.00	0.05	0.05	0.00	0.00	0.22	0.00
13th	0.00	0.01	0.00	0.92	0.00	0.01	0.00	4.60	0.00	0.00	0.13	0.00
14th	0.00	0.04	0.00	0.00	0.00	0.00	0.29	5.51	0.29	0.00	0.00	0.00
15th	0.00	0.58	0.00	0.00	0.00	0.00	0.00	1.73	0.00	0.79	0.00	0.00
16th	0.00	0.18	0.91	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
17th	0.00	0.71	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00	0.00	0.01
18th	0.17	0.00	0.00	0.00	0.00	0.01	0.71	0.10	0.25	0.00	0.00	0.00
19th	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
20th	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.25	0.00	0.00
21st	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22nd	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00
23rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97	0.00	0.00	0.00	0.01
24th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
25th	0.04	0.00	0.00	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.06	0.02
26th	0.00	0.51	0.00	0.00	0.00	0.32	0.00	1.09	0.03	0.00	0.00	1.53
27th	0.74	0.06	0.00	0.80	0.00	0.00	0.00	0.21	1.78	0.00	0.00	0.06
28th	0.00	0.20	0.00	0.00	0.00	0.17	0.35	0.84	0.15	0.01	0.75	0.00
29th	0.00	0.00	0.00	0.00	0.01	0.00	0.24	1.91	0.00	0.00	0.00	0.00
30th	0.00		0.00	0.00	0.00	0.11	0.36	0.15	0.00	0.00	0.00	0.00
31st	0.00		0.14		0.06		0.00	0.00		0.00		0.00

(Monthly Figures)

Year's Rainfall Total:

55.36

TOTAL	1.44	4.20	1.40	2.39	2.98	3.29	8.54	20.71	4.98	2.07	1.21	2.15
MAX	0.74	1.15	0.91	0.92	1.87	1.92	2.32	5.51	1.78	0.79	0.75	1.53
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.05	0.14	0.05	0.08	0.10	0.11	0.28	0.67	0.17	0.07	0.04	0.07

AREA 06B ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: Wambaw Ranger District

Francis Marion National Forrest, McClellanville, SC

2005	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st					0.12	0.68		0.04				
2nd				1.25		0.13	0.35	0.68		1.24		
3rd		0.61				0.13	0.02	0.01				
4th		0.14				0.12	2.54			0.02		
5th					1.29	0.06				0.47		
6th			0.02		0.58		0.02	0.80		7.13		0.89
7th				0.08				0.20		3.42		
8th			0.23	0.65		0.02	0.14	0.64		0.46		
9th								0.48				1.54
10th		0.17					0.71	0.01		0.12		
11th							2.08			0.06		
12th	0.01						0.56			0.05		
13th	0.30			0.18				0.06	0.20	0.02		
14th	0.57			0.78				0.01	1.00			
15th		0.03					0.03				0.01	0.08
16th	0.71		1.45		0.34		0.12				0.07	0.07
17th			0.13		3.32						0.01	
18th					0.07	0.22						1.30
19th						0.01		2.54				
20th								1.27	0.66		0.02	
21st		0.11			0.56						6.17	
22nd		1.22					0.01					
23rd	0.26		3.19	0.01			0.04	0.04				
24th		0.21						0.39		1.18		
25th						0.19		0.53		0.04		0.05
26th						0.78		0.47		0.08		
27th			1.66					0.41	0.07		0.90	
28th		1.62	0.27			0.48		0.20			0.52	
29th	0.02				0.02	1.20					2.31	0.22
30th	0.66				2.97	0.08	0.05				0.02	
31st					0.39		1.60					0.06

(Monthly Figures)

Year's Rainfall Total:

77.81

TOTAL	2.53	4.11	6.95	2.95	9.66	4.10	8.27	8.78	1.93	14.29	10.03	4.21
MAX	0.71	1.62	3.19	1.25	3.32	1.20	2.54	2.54	1.00	7.13	6.17	1.54
MIN	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.01	0.07	0.02	0.01	0.05
AVG	0.36	0.51	0.99	0.49	0.97	0.32	0.59	0.49	0.48	1.10	1.11	0.53

**Yearly Average Daily Flow Rates
Santee River Station – 02171700**

YEAR	Average Daily Flow Rates In Cubic Feet Second (CFS)
2005	10,660
2004	7,438
2003	14,806
2002	4,900
2001	2,547
2000	3,548
1999	3,703
1998	16,720
1997	10,323
1996	10,669
1995	15,978
1994	10,830
1993	14,337
1985	5,567